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09/921,382	08/02/2001	Jiaming Huang	TI-29593	6911

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER

VINH, LAN

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 12/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/921,382

Applicant(s)

HUANG ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 1-7 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-14 is/are allowed.
- 6) ☒ Claim(s) 8-11, 15-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-7, drawn to a wafer plasma etching system/apparatus, classified in class 156, subclass 345.
 - II. Claims 8-18, drawn to a method of endpoint detection in a plasma etching, classified in class 438, subclass 706.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used to practice another and materially different process such as plasma-enhanced chemical vapor depositing a layer on a substrate
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

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5. During a telephone conversation with Sam Tung on 12/3/2002 a provisional election was made with traverse to prosecute the invention of Group II, claims 8-18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-7 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Specification

6. In lines 7- 8 on page 7 of the specification, the term "the plasma system changes 104" appears to be a typographical error. The examiner suggests replacing "the plasma system changes 104" with --the plasma system 104 changes--to clarify the language of the specification.

7. For the purpose of examination, the claim language of "a matching network"/impedance matching circuitry is defined as a network, consisting of capacitor and resistor, connected to source and the plasma system in page 6 of the specification, the claim language of "changing etching parameters"/a change in etch parameters is defined as determining the proper time to stop the etch in page 12 of the specification, the claim language of "within a predetermined time" is defined as about 80 seconds in page 9 of the specification.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 11, 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 11 and 15, it is not clear what is meant by a voltage drop of not less than 5% as no basis for the percentage is provided.

10. For the purpose of examination, the claim language of "a voltage drop of less than 5%" is best understood by the examiner as a voltage decrease of more than 5% from one voltage value to another voltage value.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

12. Claims 8-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Winniczek et al (US 6,228,278).

Winniczek discloses a method for determining an etch endpoint in a plasma processing system, the plasma system having an RF power source connected to a plasma system/chamber by a network consisting of a capacitor and resistor/a matching network (fig. 4). This method comprises the steps/actions of:

using monitoring circuitry 402 to monitor the voltage at node 250 (compensating voltage) across a resistor/an element in a network consisting of a capacitor and resistor/matching network (col 5, lines 64-65; col 6, lines 40-41 and fig. 4)

the end of the etch may also be evidenced by a sharp downward slope /decrease of the compensating voltage curve 302 (col 6, lines 24-26; fig. 3). As shown in fig. 3 of Winniczek, the compensating voltage curve 302 decreases/drops more than 5% (not less than 5%) from 0.5 to 0 V. Thus, Winniczek teaches reads on determining the proper time to stop the etch /changing etching parameters when the voltage across an element undergoes a predetermined change

Regarding claim 9, fig. 4 of Winniczek shows that DC voltage source 224 (col 5, lines 38-39) provides DC voltage across the resistor and to the plasma chamber which reads on the voltage across a element is a DC voltage corresponding to a DC voltage in the plasma chamber

The limitation of using a resistor as an element, as recited in claim 10, has been discussed above.

Regarding claim 11, fig. 3 of Winniczek shows a voltage drops (curve 302) of more than 5% from 0.5 to 0 V, which reads on a claimed voltage drop of not less than 5%

13. Claims 16-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Winniczek et al (US 6,228,278).

Winniczek discloses a method for determining an etch endpoint in a plasma processing system. This method comprises the steps/actions of:

using monitoring circuitry 402 to monitor/measure the compensating voltage/voltage difference at node 250 across a resistor (col 5, lines 64-65; col 6, lines 40-41); fig. 3 shows that the compensating voltage/voltage difference at node 250 across a resistor varies when the etch time changes during the etching process in the plasma system which reads on the voltage across the resistor sensitive to changes within the plasma system where the plasma etching occurs

ending/halting the etch when the compensating voltage/voltage difference at node 250 across a resistor suddenly dips/changes (col 6, lines 24-26)

Regarding claim 17, fig. 2 of Winniczek shows that the resistor is part of a circuitry consisting of capacitor and resistor/ impedance matching circuitry between power supply/source 222 and the plasma system.

Regarding claim 18, fig. 4 of Winniczek shows that DC voltage source 224 (col 5, lines 38-39) provides DC voltage across the resistor, which reads on the voltage across an element is a DC voltage

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Allowable Subject Matter

14. Claims 12-14 are allowed.

Claim 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

The cited prior art of record fails to disclose the step of stopping etch when said voltage decreases a predetermined amount (5%) within a predetermined time (80 sec). The closest prior art of Winniczek et al (US 6,228,278) discloses the step of continuing etch when said voltage increases a predetermined amount (5%) within 80 sec/predetermined time.

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bashir et al (US 5,856,239) discloses that etch endpoints is an etch parameters (col 2, lines 50-52)

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Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.



LV

December 30, 2002